

## Loads Limits Values of Soils with Petroleum Hydrocarbons

Mihail Dumitru and Andreea Vladimirescu

Romania (mihail.dumitru@icpa.ro)

The high demand for oil and associated products as a source of energy, resulting in increased oil exploitation, producing, refining, transportation, storage, marketing and use led to high levels of environmental pollution.

The optimum bioremediation variant proved to be the one in which fertilizer (potassium humate in NPK matrix with microelements and 8% monosaccharides) applied in a 650 l/ha dose was used together with the Zeba absorbent in 32 kg/ha dose, where the TPH level dropped by 58% in 45 days from the pollution with 3% crude oil.

Most of these areas are affected by historical pollution.

Many organic contaminants may undergo an ongoing process in the soil, whereby over time contaminant become less and less subject to decomposition even though relatively can still be detected in the laboratory analyses.

In Romania about 50.000 ha are polluted with oil and/or brine.

The bioremediation was the main method of rehabilitation. The Regulation on the assessment of environmental pollution, the following are presented as guide values for total oil hydrocarbons content in soil:

- normal: less than 100 mg/kg;
- alert values for sensitive soils: 200 mg/kg;
- alert values for less sensitive soils: 1000 mg/kg;
- intervention values for sensitive soils: 500 mg/kg;
- intervention values for less sensitive soils: 2000 mg/kg.

Researches done in laboratory monitored the effect of various concentrations of oil (under 2000 mg/kg, 3000 mg/kg, 5000 mg/kg, 7000 mg/kg, 10 000 mg/kg) on germination of wheat seeds at 5 and 7 days after seeding and (fresh and dry) biomass production after 40 days. Three experiments were done: one with recently contaminated light oil, one with recently contaminated heavy oil and one with old contamination.

After 5 days from sowing, the largest number of germinated seeds was found in the experiments with old contamination. The fewest germinated seeds was found in the experience with light oil. The experience with heavy oil showed an intermediate number of emerged plants.

In all cases fertilization led to a significant increase of the wheat biomass. After 40 days, the level of total hydrocarbons was reduced on average by 55% in the case of contamination with light oil, by 42% for heavy oil contamination and 12% for old contamination.

The BTEX concentration in soil had the lowest values in the experiment with heavy oil contamination, intermediate values in the experiment with historic contamination and higher values within experiment with light oil. We make proposal to change intervention thresholds for sensitive land uses from 500 mg/kg for total oil hydrocarbons to 1000 mg/kg for recently pollution and 2000 mg/kg for old pollution (historical > 5 years). For less sensitive land uses intervention thresholds from 2000 mg/kg of total oil hydrocarbons, values increase to 500 mg/kg for recently pollution and 1000 mg/kg old pollution.